

What is claimed is:

1. An image processing apparatus for generating
2 new image data having pixel values having all color
3 information for each interpolation point set on a
4 two-dimensional plane, from original image data made up
5 of many pixels which are arrayed in a matrix on the
6 two-dimensional plane and each of which has only a pixel
7 value representing a predetermined color information
8 level obtained by an image sensor having individual
9 color filters, comprising:

10 a replacement unit for, [for a pixel value of a
11 pixel that need not be replaced by another pixel value
12 among pixel values contained in the original image data,
13 adding replacement information representing
14 non-replacement of the pixel value to the pixel value,
15 and outputting the pixel value as replacement
16 information-added image data,] and for a pixel value of a
17 pixel that needs to be replaced by another pixel value,
18 replacing the pixel value by a predetermined pixel value,
19 adding replacement information indicating replacement of
20 the pixel value to the replaced pixel value, and
21 outputting the pixel value as replacement
22 information-added image data; and

23 an interpolation unit for outputting
24 interpolated pixel values having all color information
25 by interpolating a pixel value at an interpolation point

26 for each color information on the basis of a
27 predetermined arithmetic expression from pixel values of
28 pixels of the same color falling within a predetermined
29 interpolation region containing the interpolation point
30 among all replacement information-added image data
31 output from said replacement unit, and when replacement
32 information of any pixel used for calculation indicates
33 replacement, using an arithmetic expression different
34 from the arithmetic expression.

2. An apparatus according to claim 1, further
2 comprising:

3 a compensation value calculation unit for
4 calculating a pixel compensation value for compensating
5 for a pixel value at the interpolation point based on a
6 predetermined arithmetic expression from pixel values of
7 a plurality of pixels which are positioned around the
8 interpolation point and fall within a compensation
9 region wider than and including the interpolation region,
10 and when replacement information of any pixel used for
11 calculation indicates replacement, calculating the pixel
12 compensation value based on an arithmetic expression
13 different from the arithmetic expression; and
14 a compensation unit for compensating for the
15 interpolated pixel value at the interpolation point
16 output from said interpolation unit for each color
17 information using the pixel compensation value at the

18 interpolation point calculated by said compensation
19 value calculation unit, and outputting the interpolated
20 pixel value as a new pixel value having all color
21 information at the interpolation point.

3. An apparatus according to claim 1, wherein
2 said replacement unit determines whether to replace each
3 pixel value, on the basis of defect information
4 indicating presence/absence of a defect of each pixel of
5 the image sensor.

4. An apparatus according to claim 1, wherein
2 said replacement unit replaces a pixel value using a
3 pixel value of a pixel of the same color positioned
4 neighboring the pixel.

5. An apparatus according to claim 2, wherein
2 said compensation value calculation unit calculates a
3 pixel compensation value at an interpolation point using
4 a pixel value having color information as a
5 representative of a luminance component of original
6 image data among pixels falling within the compensation
7 region.

6. An apparatus according to claim 1, wherein
2 when target calculation pixels used to calculate the
3 interpolated pixel value include a pixel whose

4 replacement information indicates, an arithmetic
5 expression is used, which has a reduced weight
6 coefficient comparing to a normal arithmetic expression
7 for calculating the interpolated pixel value, or has a
8 weight coefficient of 0 for the pixel or a plurality of
9 target calculation pixels including the pixel.

009060"090600
7. An apparatus according to claim 2, wherein
2 when target calculation pixels used to calculate the
3 pixel compensation value include a pixel whose
4 replacement information indicates replacement, an
5 arithmetic expression is used, which has a reduced
6 weight coefficient comparing to a normal arithmetic
7 expression for calculating the pixel compensation value,
8 or has a weight coefficient of 0 for the pixel or a
9 plurality of target calculation pixels including the
10 pixel.

8. An apparatus according to claim 2, wherein
2 when target calculation pixels used to calculate the
3 pixel compensation value include a pixel whose
4 replacement information indicates replacement, said
5 compensation value calculation unit outputs a pixel
6 compensation value indicating non-compensation.

9. An apparatus according to claim 1, wherein
2 said apparatus further comprises a region

09655665 "090600

3 value calculation unit for sequentially receiving pixel
4 values forming the replacement information-added image
5 data output from said replacement unit in parallel with
6 each other by a predetermined number of pixel lines as
7 pixel blocks for single pixel columns to form a
8 sub-matrix from a predetermined number of pixel blocks
9 received successively, calculating logical OR of
10 replacement information and sums of pixel values of
11 pixels included in respective regions set in advance on
12 the sub-matrix as region values of the respective
13 regions, and parallel-outputting the respective region
14 values in synchronism with reception of the pixel block,
15 and
16 an interpolation unit selectively uses the
17 respective region values parallel-output from said
18 region value calculation unit to sequentially calculate,
19 for each sub-matrix, interpolated pixel values at an
20 interpolation point on a sub-matrix to be processed.

10. An apparatus according to claim 2, wherein

2 said apparatus further comprises a region
3 value calculation unit for sequentially receiving pixel
4 values forming the replacement information-added image
5 data output from said replacement unit in parallel with
6 each other by a predetermined number of pixel lines as
7 pixel blocks for single pixel columns to form a
8 sub-matrix from a predetermined number of pixel blocks

00655565 "090600

9 received successively, calculating logical OR of
10 replacement information and sums of pixel values of
11 pixels included in respective regions set in advance on
12 the sub-matrix as region values of the respective
13 regions, and parallel-outputting the respective region
14 values in synchronism with reception of the pixel block,
15 an interpolation unit selectively uses the
16 respective region values parallel-output from said
17 region value calculation unit to sequentially calculate,
18 for each sub-matrix, interpolated pixel values at an
19 interpolation point on a sub-matrix to be processed, and
20 a compensation value calculation unit
21 selectively uses the respective region values
22 parallel-output from said region value calculation unit
23 to sequentially calculate, for each sub-matrix, a pixel
24 compensation value at the interpolation point on the
25 sub-matrix to be processed

11. An apparatus according to claim 1, wherein
2 said apparatus further comprises a defect
3 information generation unit for using relative pixel
4 position information with respect to an immediately
5 preceding defective pixel position as information
6 indicating a defective pixel position of the image
7 sensor to determine whether each pixel forming the
8 original image data is a defective pixel, and outputting
9 a determination result as defect information to said

10 replacement unit in synchronism with the each pixel, and
11 said replacement unit determines whether to
12 replace a pixel value on the basis of the defect
13 information from said defect information generation unit
14 in accordance with whether each pixel value included in
15 the original image data corresponds to a defective pixel.